

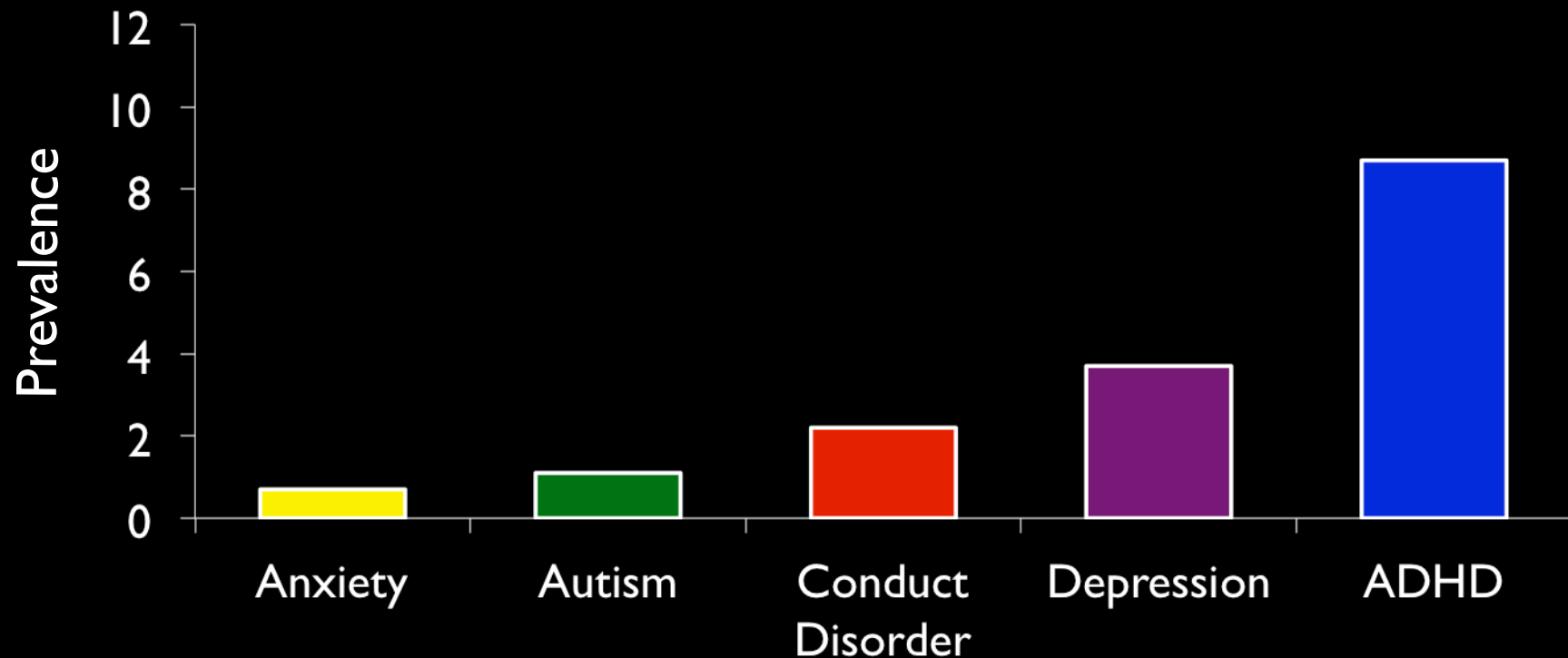


Project TENDR

The Cast of Toxic Chemicals

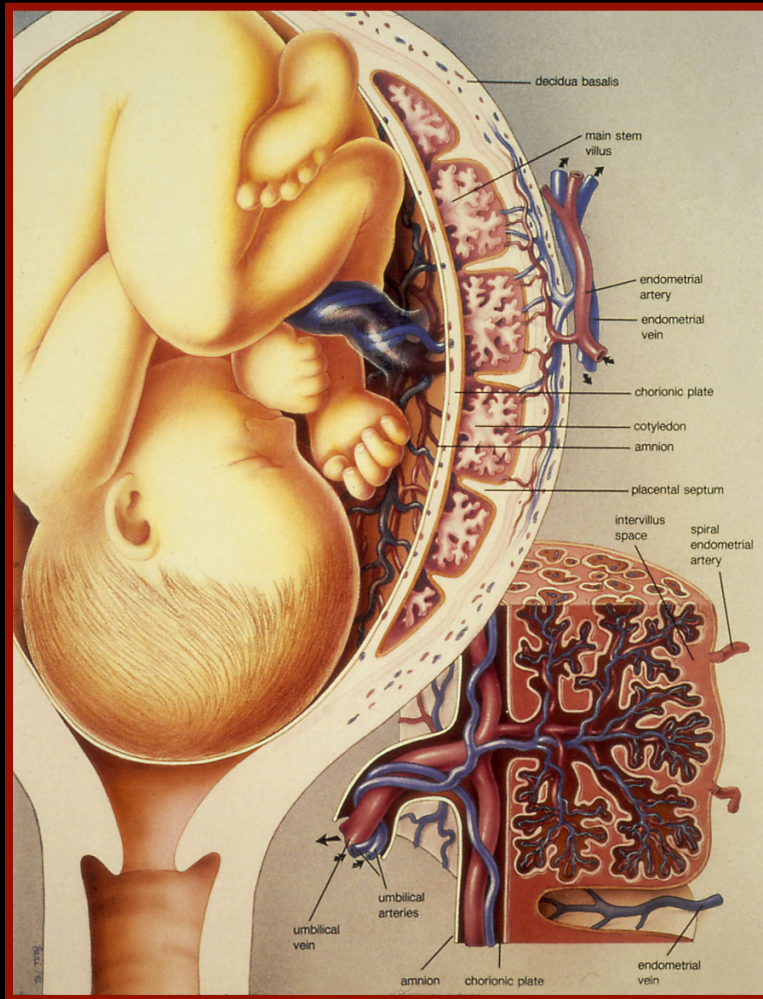
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Brain-based Disorders in Children



Merikangas KR, He JP, Brody D, et al. Prevalence and treatment of mental disorders among US children in the 2001-2004 NHANES. *Pediatrics* 2010;125:75-81. Centers for Disease Control and Prevention. Prevalence of autism spectrum disorders, United States, 2008. *MMWR Surveill Summ* 2012; 61:1-19. Boyle CA, Boulet S, Schieve LA, et al. Trends in the prevalence of developmental disabilities in US children, 1997-2008. *Pediatrics* 2011;127:1034-1042.

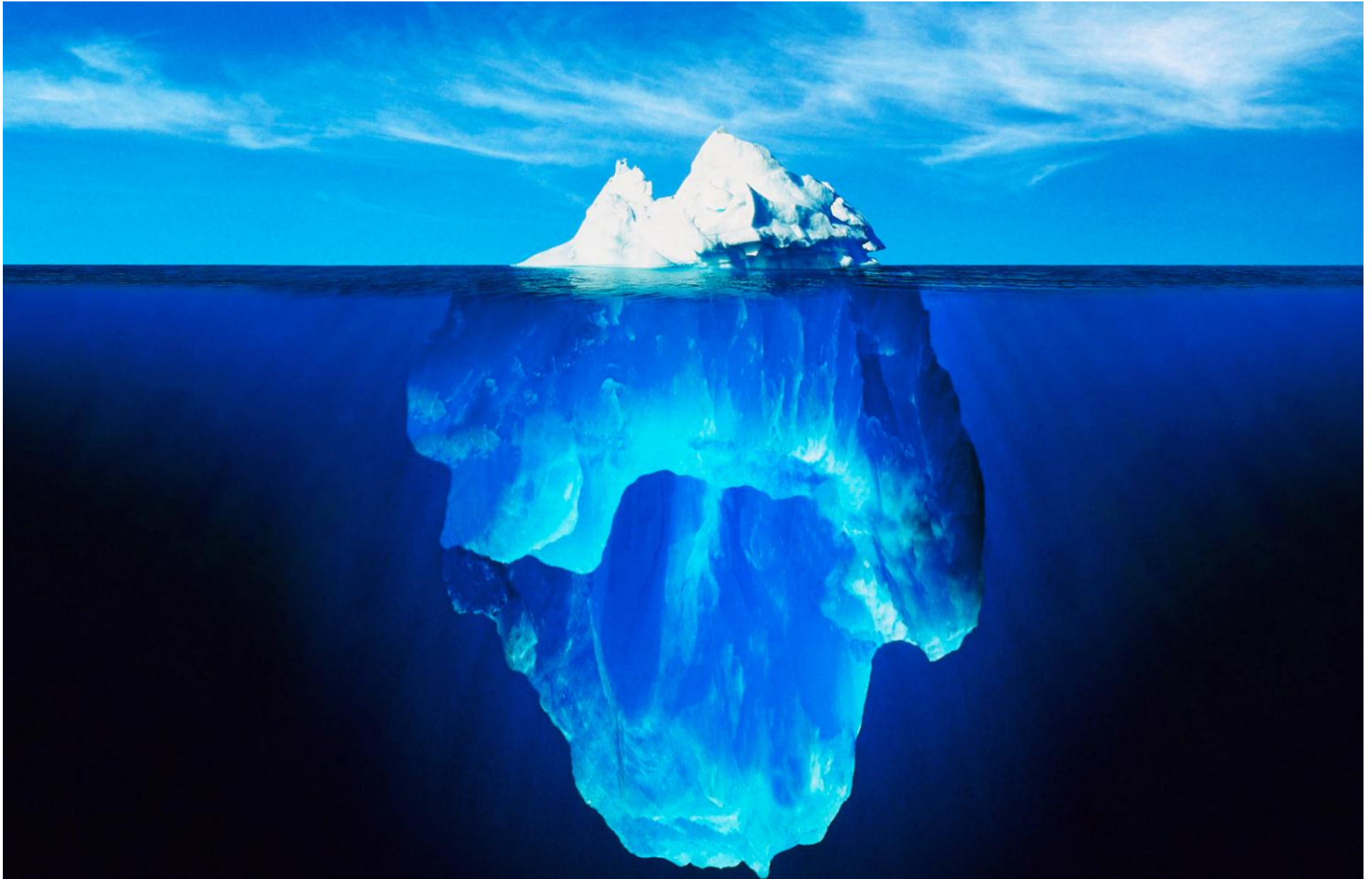
Factors that Impact Brain Development



- Sex
- Nutrition
- Preterm Birth
- Social Stressors
- Built Environment
- Maternal Depression
- Genetic Susceptibility
- Preschool Attendance
- Environmental Toxins

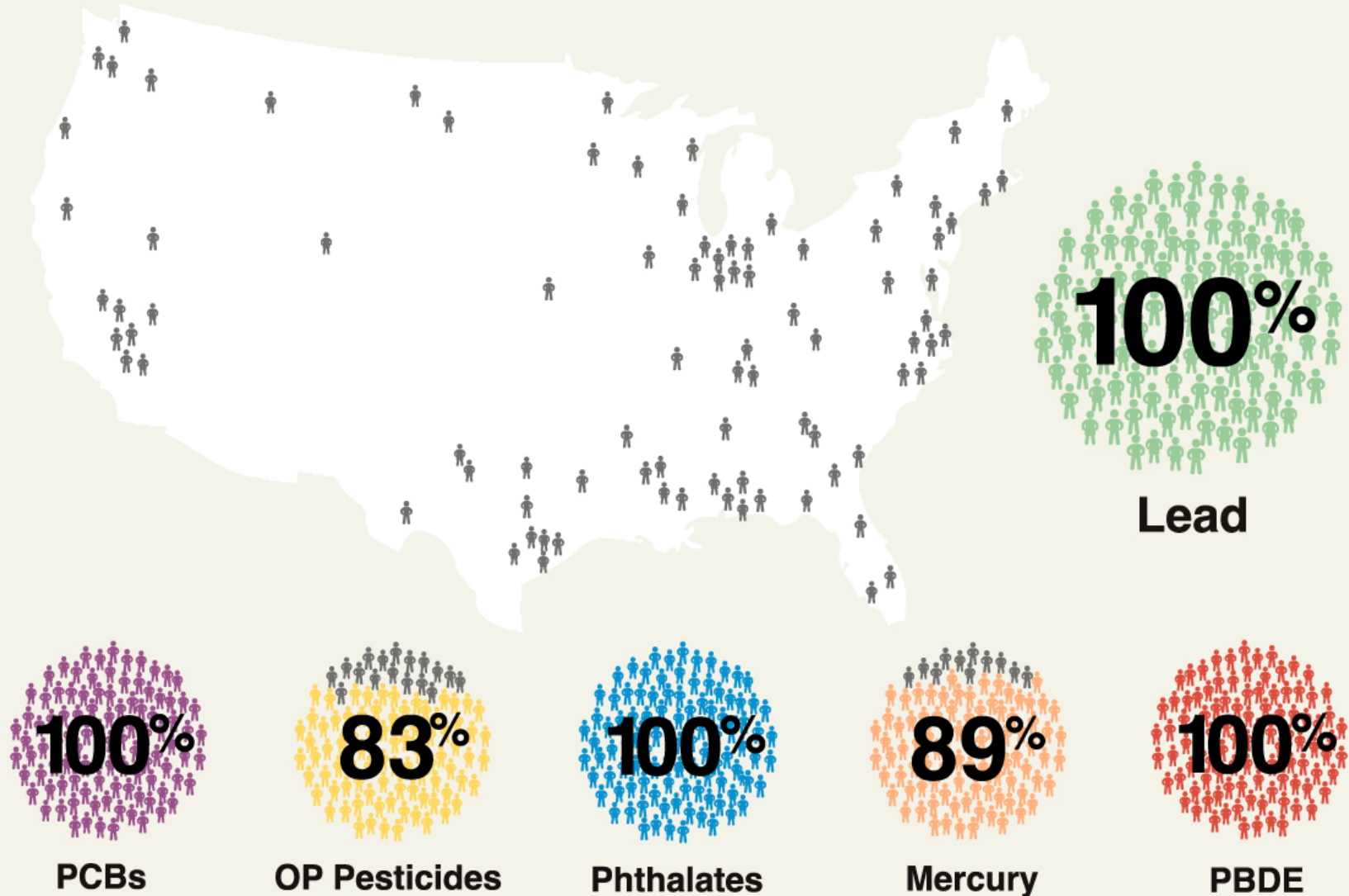
Environmental Disasters





... are just the tip of the iceberg

Percent of children and pregnant women who have detectable levels of toxins in their blood or urine.

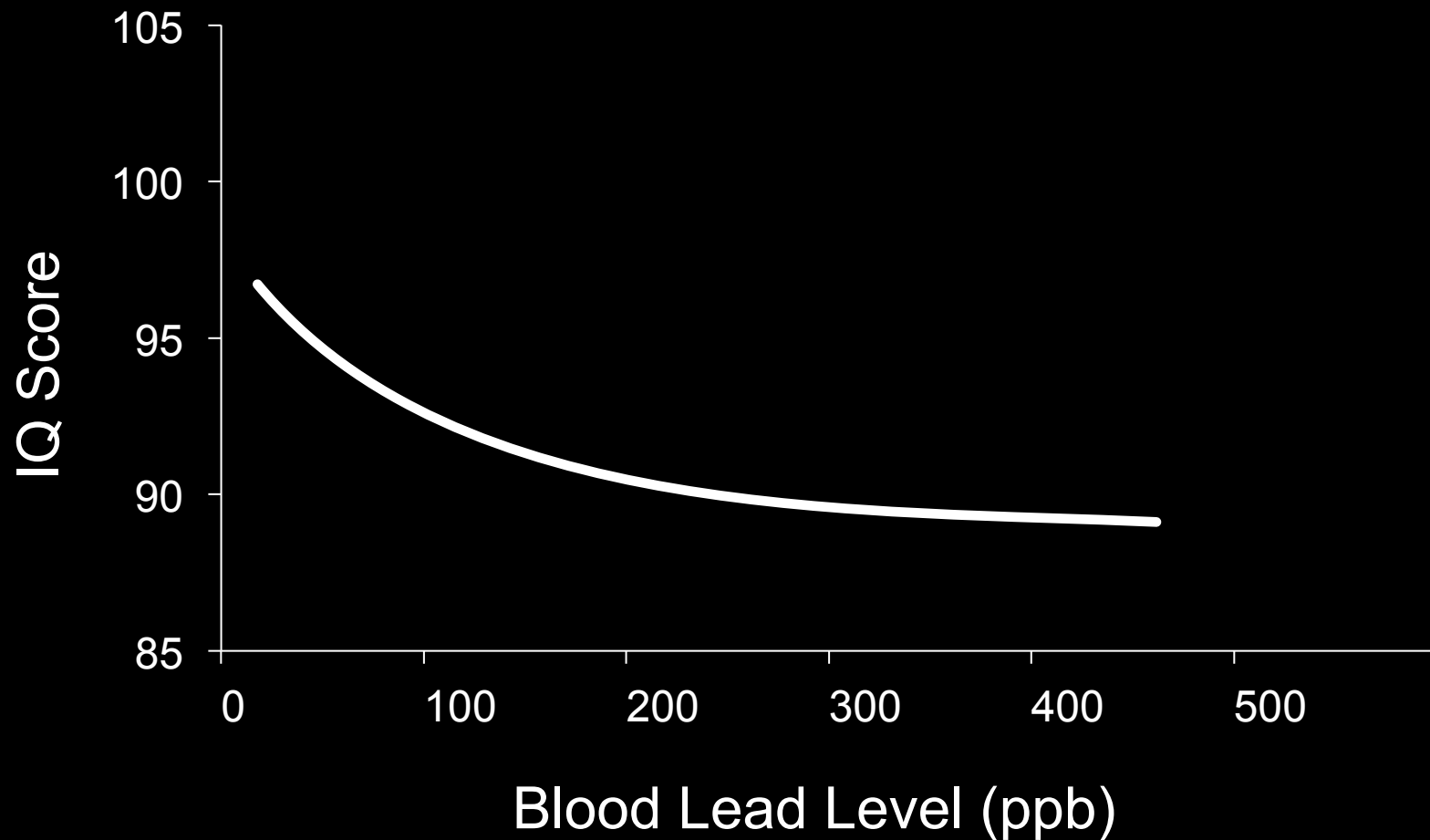


Vulnerability of the Developing Brain

- The blood brain barrier isn't fully formed; it is more permeable to toxins
- Rapidly growing cells are often more vulnerable to toxins than slowly growing cells
- Brain growth occurs over a longer duration than other organs
- The fetus and child may lack enzymes to detoxify contaminants
- Young children often more heavily exposed to contaminants than older children and adults

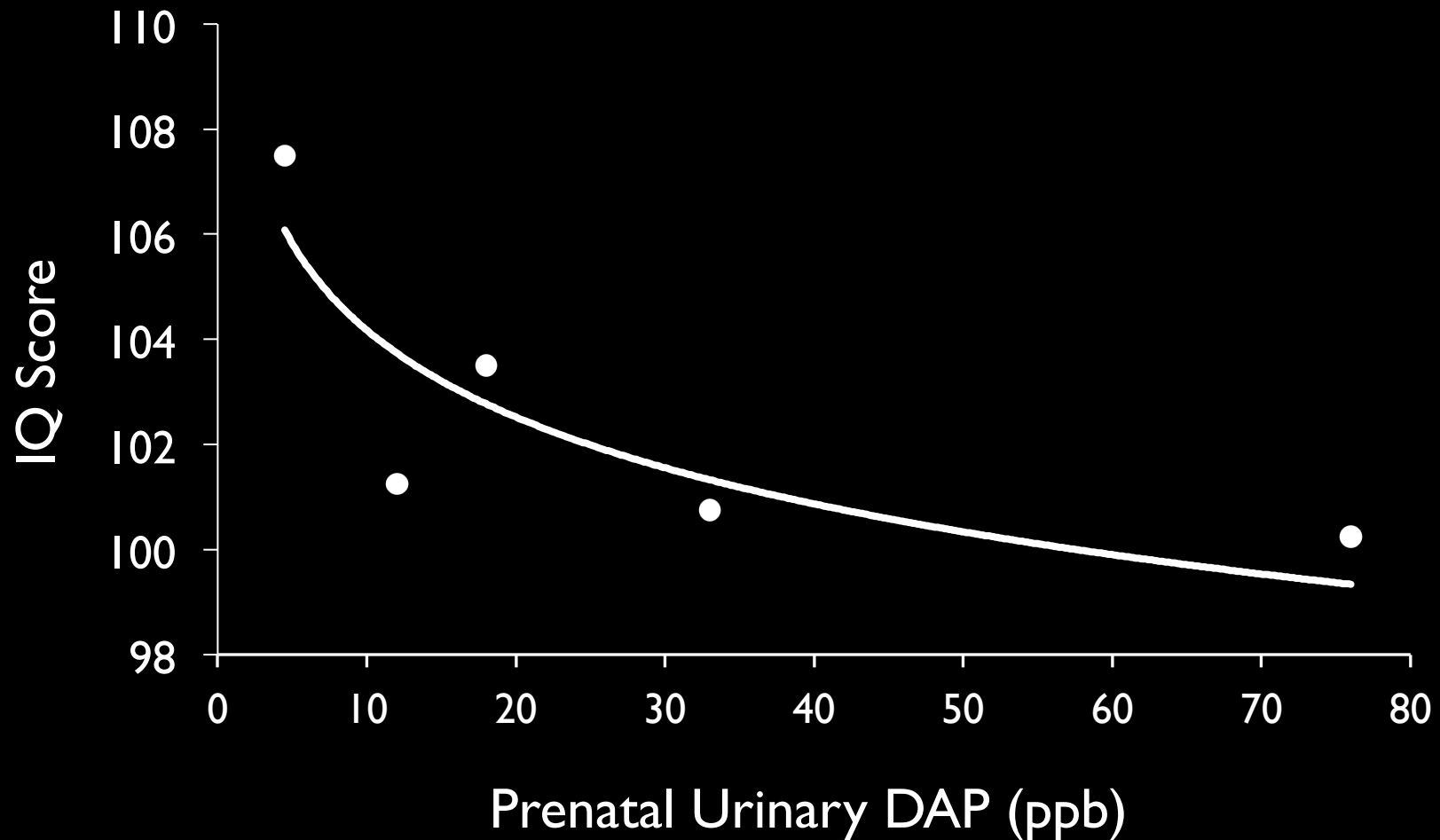
The Ongoing Search for a Threshold

Lead Toxicity and IQ Deficits



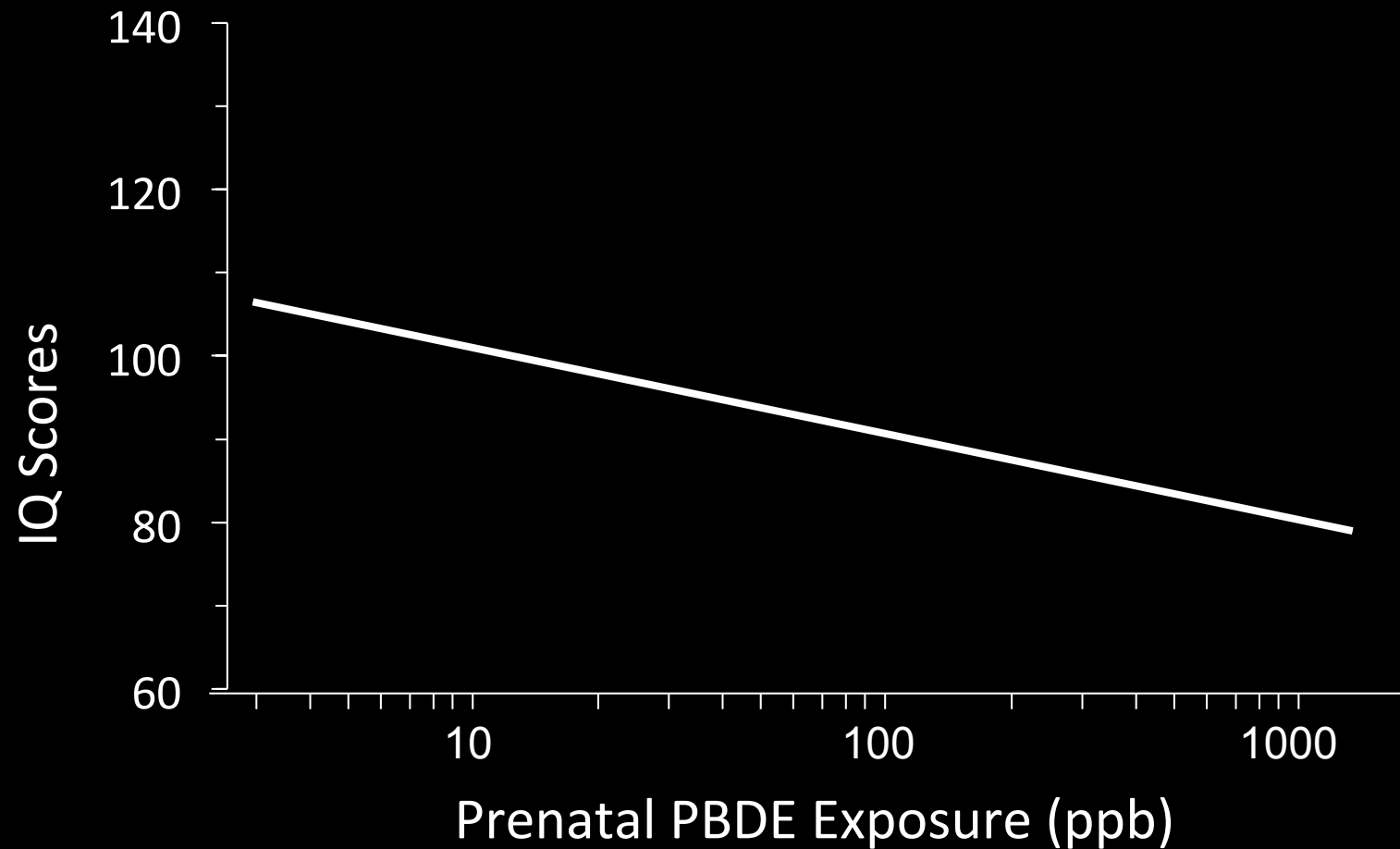
Lanphear BP, et al. EHP 2005; 113:894-899.

Prenatal OP Pesticide Exposure and IQ Scores in 7-year old Children



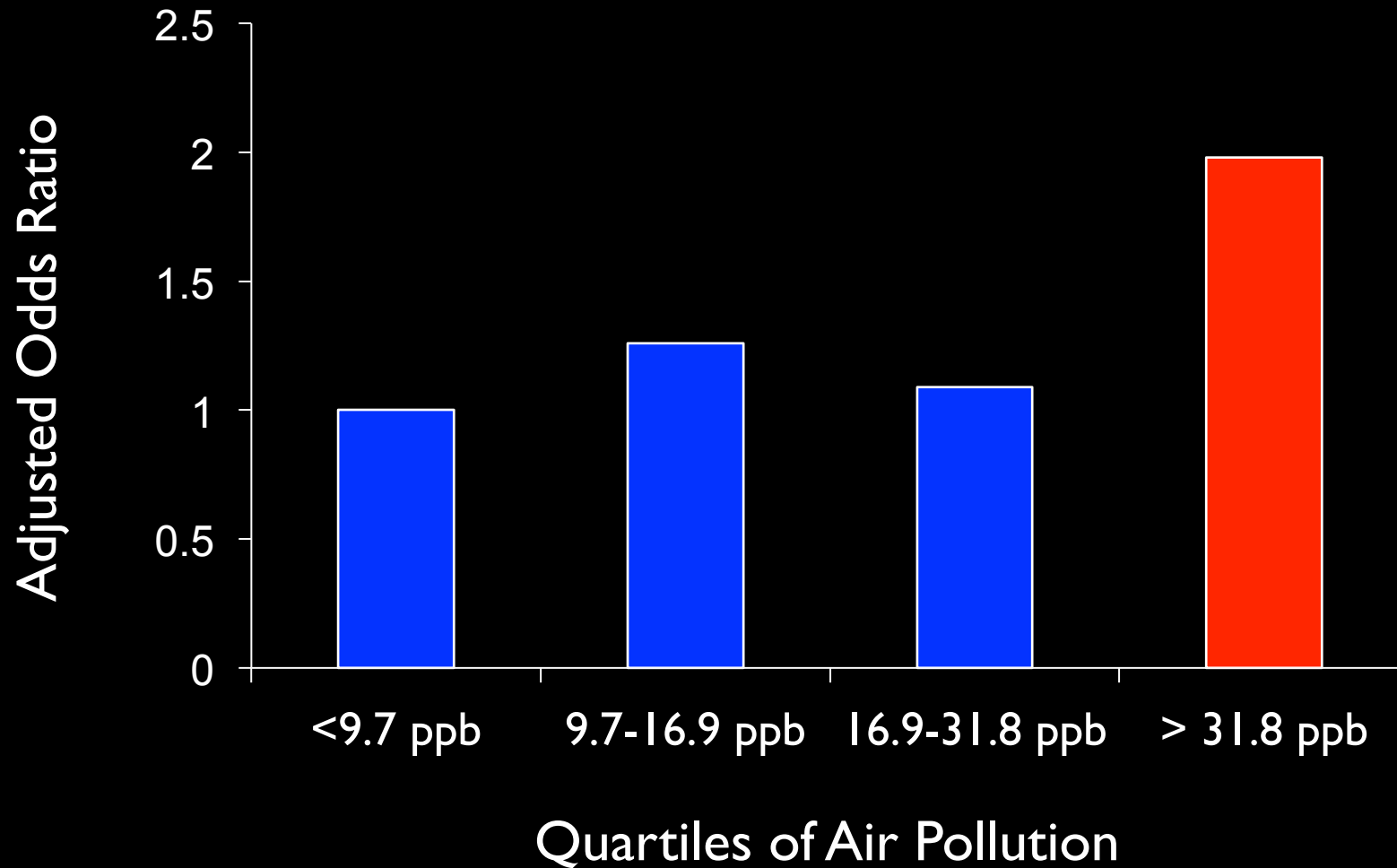
Bouchard M, et al. EHP 2011;119:1189-1195.

Prenatal Flame Retardant (PBDE) Exposure and IQ Scores in 5-year old Children



Chen A, et al. EHP (in press)

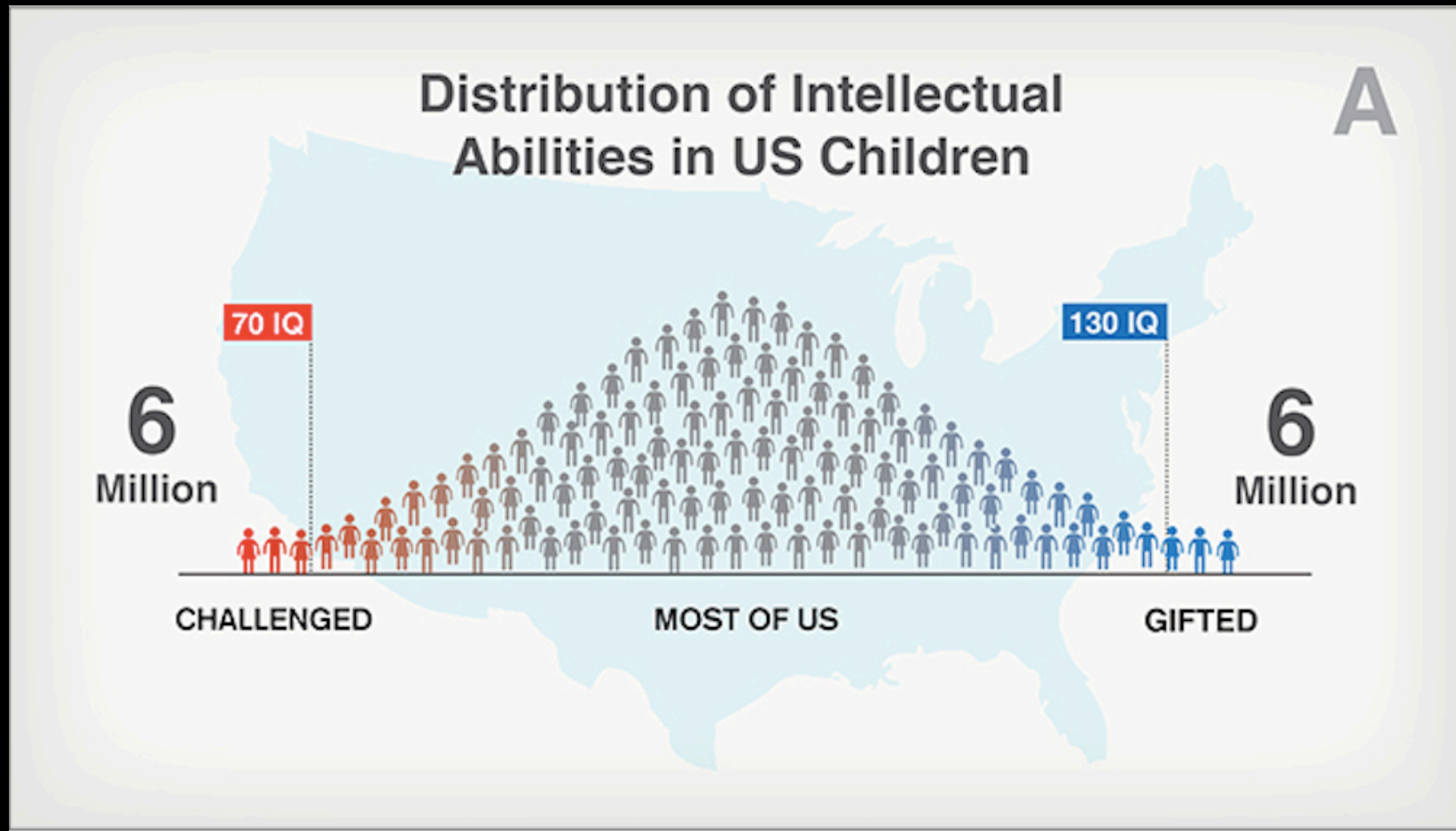
Risk of Autism by Exposure to Traffic-Related Air Pollution during Pregnancy



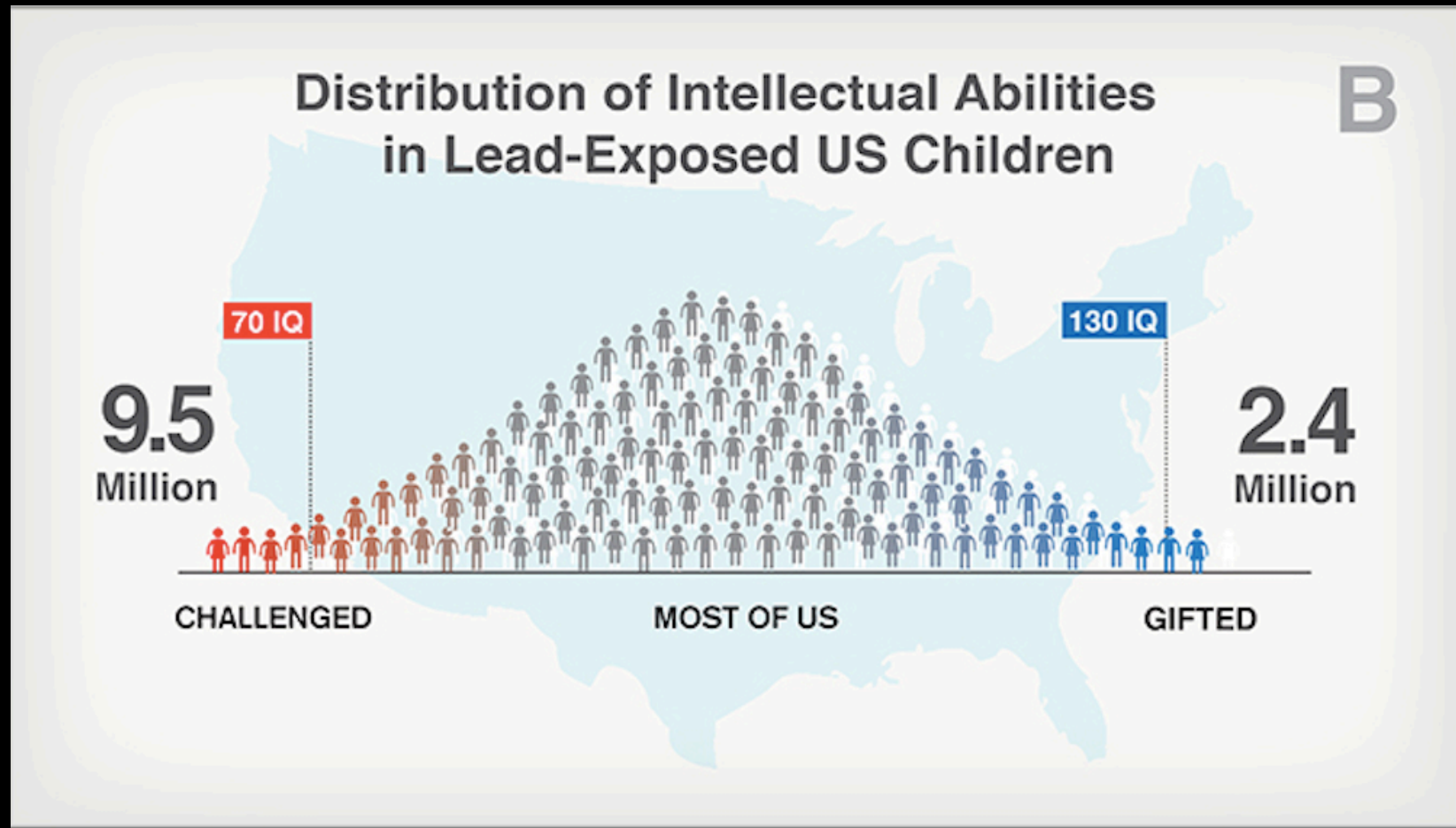
Volk H, et al. JAMA Psychiatry 2013;70:71-77.

No Acceptable Level?

Little Shifts Matter



Little Shifts Matter



\$1 = \$17 to 220

Gould E. EHP 2009;117:1162-1167.

The System is

Broken

Recommendations

- Overhaul our framework to developing and assessing evidence on toxic chemicals
- Take into account special vulnerabilities of developing fetus and children, exposures to multiple chemicals and lack of thresholds
- We call on businesses to eliminate toxic chemicals from their supply chain and products
- We call on health professionals to integrate knowledge of toxic chemicals into practice